

WHAT IS CLAIMED IS:

1. A collection of particles comprising aluminum oxide, the collection of particle having an average diameter from about 5 nm to about 500 nm and effectively no particles have a diameter greater than about four times the average diameter of the collection of particles.

2. The collection of particles of claim 1 wherein the collection of particles have an average diameter from about 5 nm to about 25 nm.

3. The collection of particles of claim 1 wherein the aluminum oxide has a crystalline structure of  $\gamma$ - $\text{Al}_2\text{O}_3$ .

4. The collection of particles of claim 1 wherein the collection of particles includes effectively no particles with a diameter greater than about three times the average diameter.

5. The collection of particles of claim 1 wherein the collection of particles includes effectively no particles with a diameter greater than about two times the average diameter.

6. The collection of particles of claim 1 wherein the collection of particles have a distribution of particle sizes such that at least about 95 percent of the particles have a diameter greater than about 40

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percent of the average diameter and less than about 160 percent of the average diameter.

7. The collection of particles of claim 1 wherein the collection of particles have a distribution of particle sizes such that at least about 95 percent of the particles have a diameter greater than about 60 percent of the average diameter and less than about 140 percent of the average diameter.

8. The collection of particles of claim 1 wherein the collection of particles have a distribution of particle sizes such that at least about 99 percent of the particles have a diameter greater than about 40 percent of the average diameter and less than about 160 percent of the average diameter.

9. A polishing composition comprising a dispersion of aluminum oxide particles of claim 1.

10. The polishing composition of claim 9 wherein the aluminum oxide aluminum oxide has a crystalline structure of  $\gamma\text{-Al}_2\text{O}_3$ .

11. The polishing composition of claim 9 wherein the polishing composition comprises from about 0.05 percent by weight to about 15 percent by weight aluminum oxide particles.

12. The polishing composition of claim 9 wherein the polishing composition comprises from about 1.0

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percent by weight to about 10 percent by weight aluminum oxide particles.

13. The polishing composition of claim 9 wherein the dispersion is an aqueous dispersion.

14. The polishing composition of claim 9 wherein the dispersion is a nonaqueous dispersion.

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C3~~ The polishing composition of claim 9 further comprising abrasive particles comprising a composition selected from the group consisting of silicon carbide, metal oxides other than aluminum oxide, metal sulfides and metal carbides.

16. The polishing composition of claim 9 further comprising colloidal silica.

17. A method for producing a collection of aluminum oxide particles having an average diameter from about 5 nm to about 500 nm, the method comprising pyrolyzing a molecular stream in a reaction chamber, the molecular stream comprising an aluminum precursor, an oxidizing agent, and an infrared absorber, where the pyrolysis is driven by heat absorbed from a laser beam.

18. The method of claim 16 wherein the aluminum oxide particles have an average diameter from about 5 nm to about 100 nm.

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